

AIRS/AMSU/HSB Version 6 Data Disclaimer

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1 AIRS/AMSU/HSB Data Disclaimer

Please read this before reporting problems with data or data availability. The following factors may have affected the data products you have ordered.

1.1 AIRS Data Product Version Numbers

The version numbers that appear in the V6 AIRS Product Files are slightly different, depending upon the product due to a staged delivery of processing code to the GES DISC. They are:

- **Level 1B AMSU-A and HSB Products:** v5.0.0.0
- **Level 1B AIRS Products:**
 - **V5.0.0.0** prior to Jan 21, 2012
 - **V5.0.21.0** starting Jan 21, 2012
- **Level 1B Calibration Subset Product:** v5.0.16.0 is still available. It will be superseded by v6.0.x at some point in the future.
- **Level 2 Products:**
 - **Level 2 AIRS+AMSU and IR-Only** standard, support, and cloud-cleared radiance products: v6.0.7.0
 - **Level 2 AIRS+AMSU+HSB:** TBD v6.0.x
 - **Level 2 CO₂:** TBD V6.x
- **Level 3 Products:**
 - **Level 3 AIRS+AMSU and IR-Only** standard, support, and quantized products: v6.0.9.0
 - **Level 3 AIRS+AMSU+HSB** standard, support, and quantized products: TBD v6.0.x
 - **Level 3 CO₂:** TBD V6.x

1.2 Differences between Version 5 and Version 6

The basic retrieval methodology has not changed between V5 and V6, but many details have changed as we have acquired more experience with the data. These changes, from Level 1 processing onward, mean that all output parameters will be slightly different in V5 when compared to previous versions and that new features have been added.

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Please consult the document:

V6_Changes_from_V5.pdf

for a discussion of the changes.

The most important difference to a user between V5 and V6 is the improved product-specific quality indicators and error estimates that are employed to set them. They are discussed in detail in the two documents:

V6_L2_Quality_Control_and_Error_Estimation.pdf

V6_L2_Product_User_Guide.pdf

Users must no longer rely on **RetQAFlag** to filter retrievals. This flag does not have a sufficient number of bits to capture the current quality control.

The quantities on which the new quality flags are based are written out in the Level 2 Support Product. We do not encourage second-guessing of the threshold values that were used to set the quality flags in the Level 2 Standard Product, but users may find these values useful if they desire to further refine their filtering of retrieved products in specific parts of the atmosphere.

The Level 3 error in V5 where layers including the surface sometimes included fictitious profiles extrapolated below the surface has been corrected.

1.3 Data Products

All data are released to the public, regardless of the state of their validation. Users are encouraged to read the documentation, especially the Quick Start documents and Data Quality and Error Estimation document.

1.3.1 AIRS/AMSU/HSB vs AIRS/AMSU vs AIRS-Only

The HSB instrument ceased operation on February 5, 2003 due to a mirror scan motor failure. A version of AIRS L2 and L3 Data Products data products is

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available up to the date of HSB failure where retrievals used AIRS/AMSU/HSB radiances.

In addition, for the entire mission we offer two sets of data products: AIRS/AMSU (i.e., retrievals using AIRS and AMSU radiances) and AIRS-Only (i.e., retrievals using only the IR radiances).

In V6, the AMSU radiances used in the retrieval of AIRS/AMSU products are the “smallest set”. Over the course of the mission, AMSU channel 4 and then AMSU channel 5 were lost. V6 retrievals employ a common set of channels throughout, i.e. the algorithm ignores AMSU channels 4 and 5 throughout the mission, even when they were operational.

The AIRS Level 2 and Level 3 data product file naming convention allows users to easily determine whether the data are AIRS/AMSU/HSB, AIRS/AMSU or AIRS-Only. Examples:

AIRH2RET: AIRS Level 2 Standard Product produced using AIRS/AMSU/HSB
AIRS.2002.09.06.183.L2.RetStd_H.v6.0.7.0.G12326043652.hdf

AIRX2RET: AIRS Level 2 Standard Product produced using AIRS/AMSU
AIRS.2002.09.06.183.L2.RetStd.v6.0.7.0.G12325222934.hdf

AIRS2RET: AIRS Level 2 Standard Product produced using AIRS-Only
AIRS.2002.09.06.183.L2.RetStd_IR.v6.0.7.0.G12326012618.hdf

AIRH3STD: AIRS Level 3 Standard Daily Product produced using
AIRS/AMSU/HSB
AIRS.2002.09.06.L3.RetStd_H001.v6.0.9.0.G12334093551.hdf

AIRX3STD: AIRS Level 3 Standard Daily Product produced using AIRS/AMSU
AIRS.2002.09.06.L3.RetStd001.v6.0.9.0.G12334093542.hdf

AIRS3STD: AIRS Level 3 Standard Daily Product produced using AIRS-Only
AIRS.2002.09.06.L3.RetStd_IR001.v6.0.9.0.G12334093505.hdf

V6_Released_Processing_File_Description.pdf provides a complete description of the AIRS Data Product file name and local granule ID (LGID) convention.

1.3.2 Invalid Values

Fields in Level 1B and Level 2 data products may contain an invalid value:

- 9999 for floating-point and 16-bit and 32-bit integers
- 1 or 255 for 8-bit fields.

1.3.3 New - Level Products

The AIRS retrieval uses layer mean quantities for water vapor, ozone, carbon monoxide, and methane. Previous versions of AIRS products reported only column totals and layer quantities for these gases. The primary products in V6 Level 2 Standard and Support Products for all gases are now level products (values at the specific pressure level upon which they are reported) instead of layer products (slab values reported on the bounding pressure level nearest to the surface). The level quantities are derived from the internal 100-layer quantities by a smoothing spline, tuned to reflect information content and atmospheric variability.

Level quantities are calculated from layer quantities by the procedure described in the Algorithm Theoretical Document

[AIRS_Layers_to_Levels_Theoretical_Basis_Document.pdf](#)

The derivation of level quantities from layer quantities is essentially done by interpolation with smoothing kernels. This mathematical transformation leads to occasional strange results for water vapor profiles with inversions, typically near the surface.

1.3.4 New - Thermodynamic/Ice Cloud Products

Four primary new cloud products are provided in the L2 Support Product: cloud thermodynamic phase, ice cloud optical thickness, ice cloud effective diameter, and effective ice cloud top temperature. The cloud thermodynamic phase is based on a series of spectral radiance tests and the presence of cloud, according to the AIRS Standard L2 effective cloud fraction product. The ice cloud optical thickness, ice cloud effective diameter, and effective ice cloud top temperature are retrieved on AIRS FOVs that contain ice, according to the cloud

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thermodynamic phase product, using an optimal estimation retrieval post-processor after completion of the AIRS Standard L2 retrieval. The remaining new cloud products are either quality control indicators, error estimates on the retrieved quantities, or detailed aspects of the initial guess and information content of the primary retrieval parameters.

1.3.5 New - Spectral OLR

The OLR products are now reported in 16 spectral bands in the L2 Support Product (**OLRBand**), averaged to the AMSU resolution. The bands (cm^{-1}) are:

10→350	700→820	1180→1390	2080→2250
350→500	820→980	1390→1480	2250→2380
500→630	980→1080	1480→1800	2380→2600
640→700	1080→1180	1800→2080	2600→3250

1.3.6 New - Boundary Layer Height

The pressure at the top of the planetary boundary layer (**bndry_lyr_top**) and associated quality control are reported in the L2 Support Product at the resolution of the AMSU FOV, since the vertical positioning of thermodynamic profile gradients are used to locate the top of the PBL. This height is reported in units of pressure (hPa).

1.4 Data Validation States

AIRS product validation states are “**Provisional**” and “**Validated: Stages 1-3**”. The state of product validation depends upon surface type, latitude and product type

Prov = Provisional: Product quality is sufficient for use by the general research community, but users are urged to contact the AIRS science team before using the data in publications

Val1 = Stage 1 Validation: Product accuracy has been estimated using a small number of independent measurements obtained from selected locations and time periods and ground-truth/field program efforts.

Val2 = Stage 2 Validation: Product accuracy has been assessed over a widely distributed set of locations and time periods via several ground-truth and validation efforts.

Val3 = Stage 3 Validation: Product accuracy has been assessed and the uncertainties in the product well established via independent measurements in a systematic and statistically robust way representing global conditions

The validation state for the Level 3 Gridded Data Product matches that of the corresponding Level 1B or Level 2 Data Product from which it is generated.

The validation states for Level 1B Data Products in release V6 are:

Level 1B Product	RMS Requirement	Uncertainty Estimate	Vertical Coverage	Val Status
AIRS IR Radiance	3%*	<0.2%	N/A	Val3
AIRS VIS/NIR Radiance	20%	10-15%	N/A	Val1
AMSU Radiance	0.25-1.2 K	1-2 K	N/A	Val3
HSB Radiance	1.0-1.2 K	1.5 K	N/A	Val3

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The validation states for Level 2 Data Products in release V6 are:

Standard Geophysical Product	RMS Req	Uncertainty Estimate	Vertical Coverage	Val Status
Cloud Cleared IR Radiance	1.0 K	Accuracy ~1 K precision 0.3-8 K	N/A	Val2
Sea Surface Temperature	0.5 K	1 K	N/A	Val3
Land Surface Temperature	1.0 K	2-3 K	N/A	Val2
Surface Emissivity	N/A		N/A	Val2
Temperature Profile	1 K / km	Tropo: 1-2 K/km above: 2-3 K/km	Surface to 1 hPa	Val3
Water Vapor Profile	15% /2km	Tropo: 15%/2km sensitivity thresh: ~30 ppmv	Surface to 200 hPa or tropopause	Val3
Total Precipitable Water	5%	~5%	N/A	Val3
Fractional Cloud Cover	5%	~5%	900 to 100 hPa	Val3
Cloud Top Height	0.5 km	~0.5 km	900 to 100 hPa	Val3
Cloud Top Temperature	1.0 K	1-2 K	900 to 100 hPa	Val3
Total O3 Column	-	5%	N/A	Val3
O3 Profile	-	20%	250 to 70 hPa	Val2
Total CO Burden	-	10%	N/A	Val3
CO Profile	-	15%		Val2
Total CH4 Burden	-	2%	N/A	Val2
SO2 Flag	-		N/A	Prov
Dust/Aerosol Flag	-		N/A	Val1
CO2	-	~2 ppmv	300-500 hPa layer	Val2
Cloud Thermodynamic phase and Ice Cloud properties	-			Prov

1.4.1 Preliminary V6 Validation Summary:

A Validation Report for V6 data is currently under preparation and will be published after the V6 data products become publicly available. A V5 Validation Report, summarizing relevant publications, is also being prepared. Early V6 validation results are partially summarized in

V6_L2 Performance_and_Test_Report.pdf

This is a brief summary of some of those results. V6 product yields (fraction of useful retrievals) are higher, especially near land surface. The V6 retrieved product uncertainties are generally smaller than those of V5 products. A spurious, long-term cooling trend in temperature profiles, first noted by Divakarla et al. (2006), has been reduced by an order of magnitude. Surface properties over both land and ocean are more realistic compared to in situ observation, as are near-surface profiles of temperature and water vapor in preliminary comparisons to radiosondes. Trace gas amounts are also more realistic in comparison to in situ and satellite data sources. Cloud top properties from V6 compare better against CloudSat/CALIPSO observations than do those from V5.

Divakarla, M., C. Barnet, M. D. Goldberg, L. McMillin, E. S. Maddy, W. W. Wolf, L. Zhou, and X. Liu (2006), Validation of Atmospheric Infrared Sounder temperature and water vapor retrievals with matched radiosonde measurements and forecasts, J. Geophys. Res., 111, doi:10.1029/2005JD006116.

1.5 AIRS/AMSU/HSB Instrument States and Liens

1.5.1 Atmospheric Infrared Sounder (AIRS)

The AIRS instrument entered 'operate' mode on 24 July 2002.

AIRS data are unavailable for the period 29 July 2002-14:14:13 to 30 August 2002-09:25:10 UTC because of instrument defrost activities and unexpected cooler shutdowns. (The shutdowns were apparently caused by ionizing radiation affecting the cooler electronics in the South Atlantic Anomaly.)

AIRS data are unavailable for the period 19 October 2002-17:03:5 to 22 October 2002-01:37:25 UTC due to a false overstroke trip by the AIRS cooler (likely caused by a radiation 'hit').

AIRS data are unavailable for the period 29 October 2003-02:00:00 to 14 November 2003-21:01:00 due to the instrument being placed in safe mode following a very large solar flare and associated coronal mass ejection. The purpose was to guard against possible permanent damage caused by the expected large flux of high energy particles (including protons). The instrument was completely off except for its survival heaters. Consequently, the AIRS instrument warmed. Upon restoration of power the instrument required prolonged cool-down and subsequent full recalibration of the spectral parameters.

AIRS data are unavailable for the period 7 November 2004-05:08:35 to 8 November 2004-00:14:08 due to the scanner unexpectedly parking. It was determined that there had been a single event upset (SEU) in the scanner control register.

Anomalous science data for 20 minutes on 20 December 2004 caused by the Moon in view during a DC Restore.

AIRS data are unavailable for the period 9 January 2010-09:45:40 UT to 26 January 2010-19:38:00. An SEU caused the 28-volt circuit that controls the on-board blackbody heater and the second-stage radiator heater to shut off. A lengthy investigation, careful restoration of full operations, and recalibration ensued.

1.5.1.1 AIRS IR Liens

- Per-granule measurements of noise (NeN) are only accurate +/- 10% when a value from a single granule is used. Users may instead use static values from channel properties files or may smooth NeN measurements over several granules to a day.
- Level 1B measurements of spectral parameters (spectral_freq, spec_shift_upwell, etc.) are not accurate. Future Level-1C products will provide a model of how shifts vary with time. Contact AskAIRS for further information.

1.5.1.2 AIRS Visible/NIR Liens

- In each scanline, at the left edge of the swath (first 3 IR footprints), the first few detectors of Channel 4 (the ones furthest South in ascending granules) have anomalously low values, less than 10% of their expected value. Since Channel 4 is primarily intended for use in a research product (energy balance studies) and the swath edges are of limited value, this problem is not considered critical.
- There appear to be low-level signals in the VIS/NIR calibration and blackbody views, where none are expected. Neither is deemed serious at this time. Specifically:
 - The last sample of the blackbody in Channel 3. This occurs day and night, and is at the fraction of a DN level.
 - The last one or two samples of the photocalibrator assembly (when the lamps are off) in Channel 2. This appears to occur during parts of every daytime granule, and has not been seen at night. It is at the 1 to 10 DN level.
- A decrease in responsivity has been observed in Visible/NIR Channel 1, and to a lesser extent in Channels 2 and 3. This has only been partially compensated for by an empirical correction, but additional data are required to validate the correction. The responses of Channels 2 and 3 erroneously decrease by about 0.4% per year.

1.5.2 Advanced Microwave Sounding Unit (AMSU)

AMSU data are unavailable for the period 29 October 2003-02:00:00 to 6 November 2003-06:00:00 due to the instrument being placed in safe mode following a very large solar flare and associated coronal mass ejection. The purpose was to guard against possible permanent damage caused by the expected large flux of high energy particles (including protons). The instrument was completely off except for its survival heaters.

1.5.2.1 AMSU Liens

- On 11/16/2004 at 13:21:19 UT all of the AMSU-A2 temperature read outs except the warm load temperatures showed a sudden and simultaneous increase in noise. Subsequent analyses indicate that failure of a compensation capacitor in the reference voltage amplifier is the most probable cause. This will have a negligible effect on science products because RF shelf temperature enters into the calibration in a small second-order term. At the same time, however, the warm load temperature appeared to undergo a decrease of 0.15 K. Analysis continues to determine whether the warm load temperature offset continued. If so, the DN to EU conversion in the calibration algorithm will require modification.
- AMSU channel 4 failed 1 October 2007
 - Radiances useful until mid-2007
- AMSU channel 5 progressively degraded beginning January 2010
 - Noise level of 0.5 K in January 2010
 - Noise level of 1.0 K in February 2011
 - Noise level of 2.0 K in February 2012 and sharply increased thereafter
- AMSU channel 7 exhibits abnormal noise levels
 - Noise level is about 5x NEdT on the average, but varies substantially
 - The added noise is not random; probable cause is spacecraft transmitter interference
 - The underlying random noise (NEdT) is within specs
 - Channel 7 should not be used until this systematic noise can be removed
- AMSU channel 6 exhibits some of the same noise characteristics as channel 7, however

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- Added noise level is a fraction of NEdT; overall level still meets specs
- Use channel 6 with confidence
- AMSU channel 9 radiometer counts exhibit sudden, large change (~0.1%) recovering suddenly or gradually after 1-3 minutes; typically appears once or a few times per day, possibly clustered; no other channels affected
 - The phenomenon is being characterized; cause as yet unknown
 - Negligible effect in most cases; use channel 9 with confidence

1.5.3 Humidity Sounder for Brazil (HSB)

HSB has not been operational since 5 February 2003-21:50 UTC due to a failure in the scan motor electronics.

1.5.3.1 HSB Liens

- HSB exhibits scan asymmetry which produces scan-dependent negative bias in scene brightness temperatures
 - A left-right asymmetry is present; the right swath edge exhibits a greater negative bias than the left edge
 - Probable cause is asymmetric space/spacecraft radiative environment
 - No scene sidelobe corrections have yet been applied
- L1B data contain fields named “**antenna_temp**” and “**brightness_temp**”. Both are well calibrated and without sidelobe correction in this release. The **brightness_temp** data field will include sidelobe correction in a future release. In this release the two fields are identical.

1.6 Aqua Spacecraft Safing Events

The Aqua spacecraft underwent two safing events. The AIRS/AMSU/HSB instrument suite did not collect data during the following periods (all times are approximate to several minutes):

27 June 2002-15:40:30 to 28 June 2002-20:36 UTC

12 September 2002-13:15:00 to 23:24 UTC.

1.6.1 Aqua Spacecraft Shutdown for Coronal Mass Ejection Event

AIRS data are unavailable for the period 29 October 2003-02:00:00 to 14 November 2003-21:01:00 due to the instrument being placed in safe mode following a very large solar flare and associated coronal mass ejection.

AMSU data are unavailable for the period 29 October 2003-02:00:00 to 6 November 2003-06:00:00 due to the instrument being placed in safe mode following a very large solar flare and associated coronal mass ejection.

1.6.2 AIRS Data Gaps Due to Single Event Upsets

At 09:45:40 UT on January 9, 2010 the AIRS 28 volt power supply for the Actuator Drive Module (ADM) dropped instantaneously to 0.8 volt. The ADM provides power and control for a number of AIRS components, including the calibration blackbody and the heater on the second stage radiator. Analysis of telemetry showed no evidence of failure of any components. After determining that the cause was an SEU caused by an energetic particle strike while over the South Atlantic Anomaly, procedures were developed and vetted to carefully bring AIRS back into operation. The turn-on sequence involved checking all major subsystems involved with the 28V power supply and evaluating science data prior to the release of the operational data stream, a time-consuming process. AIRS was brought back into operation on January 24, 2010.

At 21:17:31 UT on February 8, 2013 the AIRS scanner suddenly went into "ShutDown" mode. Examination of telemetry indicated that the transition to

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“ShutDown” was not preceded by any changes in temperature, current or voltage. Thus it appears an SEU caused by an energetic particle occurred. The scanner was restarted successfully and the AIRS instrument achieved normal operations at 20:49:19 UT on February 9. Normal data flow was initiated with the transition to “OPERATE” mode then took place at 01:16:33 UT on February 10.

1.7 Occasional Data Outages

The AIRS/AMSU/HSB instrument suite has been shut down periodically for orbital correction maneuvers (drag makeup burns, delta inclination maneuvers, debris avoidance maneuvers) and MODIS lunar calibration maneuvers. The two tables in the file below list all such outages through May 25, 2016.

AIRS Ready/Operate Times due to MODIS lunar cal roll Maneuvers					
Year/DOY	Date	Guard Test CheckOut	Guard Test Operate	Ready (UT)	Operate (UT)
2002/200	Jul 19			19:55:22	22:30:30
2002/289	Oct 16			14:05:00	14:53:00
2002/319	Nov 15			4:29:00	4:58:00
2002/348	Dec 14			21:59:00	22:20:05
2003/013	Jan 13			18:37:00	19:03:00
2003/043	Feb 12	11:25:00	11:54:00	13:48:00	14:19:00
2003/073	Mar 14	6:00:00	6:29:00	7:26:00	7:59:00
2003/112	Apr 12	19:32:00	19:58:00	20:13:00	20:43:00
2003/132	May 12	4:54:05	5:20:00	5:47:00	6:14:00
2003/161	Jun 10	10:58:00	11:26:00	12:01:30	12:31:00
2003/190	Jul 9	12:07:00	12:33:00	18:09:00	18:44:00
2003/337	Dec 3	N/A	N/A	18:34:00	18:56:00
2004/002	Jan 2	10:22:00	10:50:00	15:10:00	15:33:00
2004/001	Feb 1	11:28:00	N/A	11:56:45	12:26:40
2004/062	Mar 2	6:41:00	N/A	7:10:00	7:45:00
2004/092	Apr 1	0:16:18	0:45:00	2:33:00	3:05:00
2004/121	Apr. 30	11:19:10	11:47:00	17:04:00	17:31:00
2004/150	May 29	23:10:00	23:37:00		
2004/151	May 30			4:18:00	4:46:00
2004/180	Jun 28	11:01:00	11:28:00	12:06:00	12:40:00
2004/297	Oct 23	20:25:35	20:51:00	22:12:00	22:47:00
2004/356	Dec 21	11:00:40	11:28:00	16:41:00	17:02:00
2005/020	Jan 21	7:55:00		8:25:00	8:56:00

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AIRS Ready/Operate Times due to MODIS lunar cal roll Maneuvers					
Year/DOY	Date	Guard Test CheckOut	Guard Test Operate	Ready (UT)	Operate (UT)
2005/049 & 2005/050	Feb 19	23:03:06	23:30:00	03:40:00	04:15:00
2005/079 & 2005/080	Mar 21	23:15:00	23:42:00	00:38:30	01:13:00
2005/109	Apr 19	11:05:00	11:31:00	18:24:00	18:54:00
2005/139	May 19	11:18:00	11:45:00	12:15:00	12:43:00
2005/168 & 2005/169	Jun 17 June 18	23:08:00	23:35:00	01:02:00	01:36:00
2005/286	Oct 13	11:48:00	12:15:00	16:06:00	16:42:00
2005/315	Nov 11	19:31:00	19:58:00	20:32:00	21:01:00
2005/346	Dec 12	19:38:30	20:05:30		
2006/009	Jan 9	10:09:00	10:36:00	14:50:00	15:18:00
2006/038 & 2006/039	Feb 7 Feb 8	22:50:00	23:17:00	05:06:00	05:40:00
2006/068	Mar 9	19:45:00	20:12:00	21:07:00	21:41:00
2006/098	Apr 8	10:04:00	10:31:00	16:31:00	17:02:00
2006/128	May 8	08:38:00	09:05:00	10:22:00	10:50:00
2006/158	Jun 7	07:12:00	07:39:00	04:08:00	04:41:00
2006/187	Jul 6	10:00:00	10:27:00	13:34:00	14:18:00
2006/305	Nov 1	20:04:00	20:34:00	19:26:00	
2006/335	Dec 1	06:18:00	06:45:00	03:03:00	03:29:00
2006/364	Dec 30	09:04:00	09:31:00	07:11:00	07:37:00
2007/028	Jan 28	18:22:00	18:49:00	16:28:00	17:02:00
2007/058	Feb 27	07:07:00	07:34:00	03:31:00	04:06:00
2007/117	Apr 27	08:01:00		08:30:30	08:57:00
2007/147	May 27	07:01:00	07:28:00	02:18:00	02:49:00
2007/176	25-Jun	19:42:00	20:09:00	18:18:00	18:56:00
2007/211	30-Jul	20:12:00	20:39:00	N/A	N/A
2007/242	30-Aug	21:08:00	21:35:00	N/A	N/A
2007/270	27-Sep	19:53:00	20:20:00	N/A	N/A
2007/306	2-Nov	19:27:00	19:54:20	N/A	N/A
2007/324	20-Nov	19:15:00	19:42:00	16:10:00	16:30:00
2007/354	20-Dec	19:28:00	19:55:00	N/A	N/A
2008/018	18-Jan	09:04:00	09:31:00	10:23:00	10:55:00
2008/047	16-Feb	21:44:00	22:11:00	19:47:00	20:21:00
2008/077	17-Mar	07:07:00	07:34:00	03:35:00	04:08:00
2008/106	15-Apr	19:47:00	20:14:00	14:48:00	15:16:00
2008/136	15-May	06:49:00	07:16:00	03:43:00	04:11:00
2008/165	13-Jun	19:31:00	19:58:00	16:28:00	17:03:00
2008/197	15-Jul	21:09:00	21:36:00	N/A	N/A

AIRS/AMSU/HSB Version 6 Data Disclaimer

AIRS Ready/Operate Times due to MODIS lunar cal roll Maneuvers					
Year/DOY	Date	Guard Test CheckOut	Guard Test Operate	Ready (UT)	Operate (UT)
2008/239	26-Aug	20:07:00	20:34:00	N/A	N/A
2008/284	10-Oct	21:15:00	21:42:00	19:49:00	20:23:00
2008/314	9-Nov	06:38:00	07:05:00	03:36:00	04:00:00
2008/343	8-Dec	20:59:00	21:26:00	22:31:00	22:52:00
2009/007	7-Jan	06:22:00	06:49:00	04:24:00	04:53:00
2009/036	5-Feb	20:41:00	21:08:00	15:25:00	15:58:00
2009/065	6-Mar	21:50:00	22:17:00	23:13:00	23:40:00
2009/095	5-Apr	08:52:00	09:19:00	07:07:00	07:30:00
2009/124	4-May	18:19:00	18:46:00	15:06:00	15:27:00
2009/153	2-Jun	21:00:00	21:27:00	22:56:00	23:24:00
2009/183	2-Jul	06:22:00	06:49:00	05:01:00	05:34:00
2009/251	8-Sep	19:07:00	19:34:00	N/A	N/A
2009/272	29-Sep	19:27:00	19:54:00	14:42:00	15:14:00
2009/302	29-Oct	09:44:00	10:11:00	08:19:00	08:43:00
2009/332	28-Nov	08:18:00	08:45:00	06:39:00	06:54:00
2009/361	27-Dec	19:19:00	19:46:00	17:25:00	17:46:00
2010/026	26-Jan	No AIRS commanding—still in Ready mode after anomaly of January 9			
2010/055	24-Feb	19:01:00	19:28:00	17:05:00	17:32:00
2010/085	26-Mar	06:02:00	06:29:00	02:36:00	02:59:00
2010/114	24-Apr	08:48:00	09:15:00	10:33:00	10:54:00
2010/143	23-May	19:49:00	20:16:00	15:08:00	15:34:00
2010/172	21-Jun	19:18:00	19:45:00	21:14:00	21:45:00
2010/261	18-Sep	10:57:00	11:24:00	09:32:00	10:04:00
2010/291	18-Oct	07:52:00	08:52:30	06:25:00	06:51:00
2010/321	17-Nov	06:24:00	06:51:00	01:37:00	01:51:00
2010/350	16-Dec	20:43:00	21:10:00	18:55:00	19:11:00
2011/015	15-Jan	19:17:00	19:44:00	14:03:00	14:28:00
2011/045	14-Feb	21:08:00	21:35:00	06:03:00	06:29:00
2011/074	15-Mar	20:38:00	21:05:00	18:57:00	19:13:00
2011/104	14-Apr	07:39:00	08:06:00	06:02:00	06:23:00
2011/133	13-May	18:40:00	19:07:00	12:17:00	12:41:00
2011/162	11-Jun	09:54:00	10:21:00	16:17:40	17:45:00
2011/191	10-Jul	19:17:00	19:44:00	20:46:00	21:57:00
2011/280	7-Oct	09:17:00	09:44:00	11:07:00	11:36:00
2011/309	5-Nov	10:21:00	10:48:00	18:54:00	19:12:00
2011/339	5-Dec	10:37:00	11:04:00	18:50:00	19:04:00

AIRS/AMSU/HSB Version 6 Data Disclaimer

AIRS Ready/Operate Times due to MODIS lunar cal roll Maneuvers					
Year/DOY	Date	Guard Test CheckOut	Guard Test Operate	Ready (UT)	Operate (UT)
2012/004	4-Jan	10:48:00	11:15:00	12:15:00	12:36:00
2012/034	3-Feb	07:44:00	08:11:00	09:08:00	09:33:00
2012/063-064	3-4 Mar	22:04:00	22:31:00	02:49:00	03:13:00
2012/093	2-Apr	10:45:00	11:12:00	18:56:00	19:18:00
2012/122-123	1-2 May	23:26:00	23:53:00	06:10:00	06:32:00
2012/152	31-May	10:26:00	10:53:00	12:21:00	12:46:00
2012/181	29-Jun	09:55:00	10:22:00	17:59:16	19:09:00
2012/269	25-Sep	10:44:00	11:11:00	14:16:00	14:45:00
2012/298-299	24-25 Oct	23:24:00	23:51:00	01:17:00	01:39:00
2012/328	23-Nov	10:25:00	10:52:00	18:46:00	19:00:00
2012/358	23-Dec	20:31:00	20:58:00		no roll (AMSR-E concerns)
2013/023	23-Jan	19:48:00	20:15:00		no roll (AMSR-E concerns)
2013/051-052	20-21 Feb	23:31:00	23:58:00	02:34:00	03:00:00
2013/081	22-Mar	20:26:00	20:53:00	21:56:00	22:21:00
2013/111	21-Apr	10:45:00	11:12:00	14:06:00	14:29:00
2013/140-141	20-21 May	21:46:00	22:13:00	02:54:00	03:20:00
2013/170	19-Jun	10:26:00	10:53:00	12:20:00	12:49:00
2013/199	18-Jul	09:55:00	10:22:00	20:04:00	20:35:00
2013/228	16-17- Aug	22:35:00	23:02:00	00:30:00	01:01:00
2013/258	15-Sep	06:18:00	06:45:00	08:12:40	08:41:20
2013/287	14-Oct	10:44:00	11:11:00	17:33:00	17:59:00
2013/316	12-Nov	21:46:00	22:13:00	23:39:00	23:54:10
2013/346	12-Dec	10:26:00	10:53:00	15:22:00	15:35:00
2014/010-011	10-11- Jan	23:06:00	23:33:00	03:52:00	04:11:00
2014/040	09-Feb	21:40:00	22:07:00	23:07:00	23:29:00
2014/070	11-Mar	21:52:00	22:19:00	23:24:00	23:47:00
2014/100	10-Apr	10:33:00	11:00:00	13:25:04	14:25:00
2014/129-130	9-10 May	23:13:00	23:38:00	07:37:40	07:58:15
2014/159	08-Jun	20:07:00	20:34:00	22:01:00	22:26:00
2014/189	08-Jul	07:08:00	07:35:00	09:03:00	09:32:00
2014/218	06-Aug	18:09:00	18:36:00	20:04:00	20:34:00
2014/247-248	4-5 Sep	22:35:00	23:02:00	03:47:00	04:16:30

AIRS/AMSU/HSB Version 6 Data Disclaimer

AIRS Ready/Operate Times due to MODIS lunar cal roll Maneuvers					
Year/DOY	Date	Guard Test CheckOut	Guard Test Operate	Ready (UT)	Operate (UT)
2014/277	04-Oct	11:15:00	11:42:00	13:08:00	13:35:00
2014/306	02-Nov	10:44:00	11:11:00	19:13:00	19:34:00
2014/336	02-Dec	20:50:00	21:17:00	No spacecraft roll	
2014/365	31-Dec	20:19:00	20:46:00	No spacecraft roll	
2015/29–30	29-30- Jan	23:07:00	23:34:00	02:13:00	02:34:00
2015/059	28-Feb	10:08:00	10:35:00	18:13:00	18:35:00
2015/089	30-Mar	087/10:32:00	087/10:59:00	11:55:00	12:16:00
2015/119	29-Apr	117/10:45:00	117/11:12:00	Cancelled	
2015/148	28-May	146/20:07:00	146/20:34:00	23:25:00	23:49:00
2015/178	27-Jun	176/20:20:00	176/20:47:00	15:26:00	15:53:00
2015/208	27-Jul	206/20:31:00	206/20:58:00	04:06:00	04:36:00
2015/237	25-Aug	235/20:00:00	235/20:27:00	16:46:00	17:16:00
2015/267	24-Sep	265/20:13:00	265/20:40:00	05:24:59	05:53:03
2015/296	23-Oct	294/21:21:00	294/21:48:00	16:25:00	16:50:00
2015/325	21-Nov	323/20:50:00	323/21:17:00	22:28:00	22:46:00
2015/355	21-Dec	353/21:02:00	353/21:29:00	No spacecraft roll	
2016/019	19-Jan	017/20:31:00	017/20:56:00	16:53:00	17:12:00
2016/049	18-Feb	047/20:44:00	047/21:11:00	02:13:00	02:35:00
2016/078	18-Mar	076/21:52:00	076/22:19:00	14:57:00	15:19:00
2016/108	17-Apr	106/20:26:00	106/20:53:00	05:24:00	05:45:00
2016/137	16-May	135/21:33:00	135/22:00:00	21:30:00	21:52:00
2016/167	15-Jun	165/20:06:00	165/20:33:00	13:33:00	13:58:00

AIRS/AMSU/HSB Version 6 Data Disclaimer

AQUA Maneuver Burn Table since Launch				
Drag Burn No.	Year/DOY	Date	Drag burn Start Time	AIRS READY MODE DURATION
1	2002/192	Jul 11	15:08:00	
2	2002/234	Aug 22	15:32:00	
3	2002/259	Sep 16	14:58:00	13:02 - 16:48
4	2002/290	Oct 17	15:38:00	
5	2002/316	Nov 12	15:40:30	14:20 - 17:26
6	2002/346	Dec 12	15:40:00	14:30 - 17:26
7	2003/003	Jan 03	15:55:00	15:00 - 17:38
8	2003/030	Jan 30	21:26:00	19:22 - 23:00
9	2003/078	Mar 19	16:15:00	15:25 - 18:03
10	2003/114	Apr 24	16:29:42	15:59 - 18:38
11	2003/163	June 12	15:47:30	14:55 - 17:30
12	2003/309	Nov 5	15:00:00	13:14 - 16:45
13	2003/351	Dec 17	17:10:00	17:06 - 19:31
14	2004/021	Jan 21	16:00:00	15:00 - 17:46:33
15	2004/112	Apr 21	15:49:00	14:44 - 17:30
16	2004/174	June 22	20:46:00	19:05 - 22:31:48
17	2004/218	Aug 5	10:31:46	9:44:00 - 12:13:48
18	2004/323	Nov 18	15:32:02	14:30:00 - 17:17:00
19	2005/012	Jan 12	18:32:51	17:46:00 - 20:26:50
20	2005/061	Mar 3	17:47:00	16:58:00 - 19:28:50
21 aborted	2005/131	May 11	N/A	14:40:00 - 17:21:50
21	2005/133	May 13	16:20:00	15:50:00 - 18:01:50
22	2005/215	Aug 3	16:40:00	15:52:00 - 18:31:50
23	2005/279	Oct 6	16:05:00	14:55:00 - 17:51:50
24 aborted	2005/335	Dec 1	N/A	14:03:00 - 16:51:50
24	2005/342	Dec 8	15:26:00	14:17:00 - 17:07:50
25	2006/032	Feb 1	15:41:10	15:18:00 - 17:22:50
26	2006/109	Apr 19	15:33:10	14:48:00 - 17:29:50

AIRS/AMSU/HSB Version 6 Data Disclaimer

AQUA Maneuver Burn Table since Launch				
Drag Burn No.	Year/DOY	Date	Drag burn Start Time	AIRS READY MODE DURATION
27	2006/165	Jun 14	14:22:03	13:58:00 - 16:03:50
28	2006/319	Nov 15	15:19:17	14:47:00 - 17:18:50
29	2007/004	Jan 4	16:20:00	16:03:00 - 18:01:50
30	2007/193	12-Jul	14:35:21	13:53:00 – 16:36:50
31	2007/313	9-Nov	15:35:00	14:42:00 – 17:36:50
32	2008/009	9-Jan	15:59:52	15:38:00 – 18:28:50
33	2008/114	23-Apr	16:03:00	15:43:00 – 18:31:50
34	2008/206	24-Jul	14:50:00	14:28:00 – 16:31:50
35	2008/289	15-Oct	15:20:00	14:58:00 – 21:43:50
36	2008/339	4-Dec	15:10:00	14:50:00 – 16:51:50
37	2009/218	6-Aug	15:30:00	15:08:00 – 17:10:50
38	2009/322	18-Nov	16:16:32	15:51:00 – 17:59:50
39	2009/329	25-Nov	15:08:08	14:23:00 – 16:50:50
40	2010/028	28-Jan	15:09:36	14:28:00 – 16:51:50
41	2010/105	15-Apr	15:26:56	14:43:00 – 17:09:50
42	2010/208	27-Jul	15:33:40	14:43:00 – 17:16:50
43	2010/272	29-Sep	14:42:07	13:58:00 – 16:42:50
44	2010/321	17-Nov	16:43:53	16:18:00 – 18:26:50
DAM #2	2011/002	2-Jan	15:43:00	14:38:00 – 17:25:53
DAM #3	2011/060	1-Mar	14:18:00	13:38:00 – 15:59:53

AIRS/AMSU/HSB Version 6 Data Disclaimer

AQUA Maneuver Burn Table since Launch				
Drag Burn No.	Year/DOY	Date	Drag burn Start Time	AIRS READY MODE DURATION
48	2011/110	20-Apr	15:18:00	14:28:00 – 17:21:53
49	2011/159	8-Jun	14:48:38	13:32:00 – 16:41:53
50	2011/173	22-Jun	15:00:32	13:42:00 – 16:42:53
51	2011/243	31-Aug	not supplied	15:41:20 – 17:51:53
52	2011/272	29-Sep	15:39:20	14:28:00 – 17:21:53
53	2011/298	25-Oct	14:27:00	14:03:00 – 16:09:53
54	2011/321	17-Nov	14:42:06	14:09:00 – 16:24:53
55	2011/340	6-Dec	15:21:00	14:43:00 – 17:03:53
56	2011/354	20-Dec	15:24:10	14:53:00 – 17:08:53
57	2011/025	25-Jan	15:00:00	14:28:00 – 16:42:53
58	2011/074	14-Mar	15:38:11	15:13:00 – 17:20:53
59	2012/145	24-May	14:01:00	13:41:00 – 15:44:53
60	2012/173	21-Jun	16:45:11	15:43:00 – 18:28:53
61	2012/222	9-Aug	15:12:00	14:48:00 – 16:55:53
62	2012/257	13-Sep	15:43:39	15:18:00 – 17:27:53
63	2012/271	27-Sep	15:47:53	15:23:00 – 17:31:53
64	2012/313	8-Nov	15:00:00	14:34:00 – 16:44:53
65	2012/333	28-Nov	14:48:30	14:03:00 – 16:31:53
66	2012/354	19-Dec	15:10:00	15:07:00 – 16:53:53
67	2013/025	25-Jan	16:02:00	15:59:00 – 17:45:53
68	2013/045	14-Feb	16:30:21	16:27:00 – 18:13:53

AIRS/AMSU/HSB Version 6 Data Disclaimer

AQUA Maneuver Burn Table since Launch				
Drag Burn No.	Year/DOY	Date	Drag burn Start Time	AIRS READY MODE DURATION
69	2013/069	10-Mar	16:30:45	16:27:00 - 18:13:53
70	2013/082	23-Mar	10:34:55	08:49:55 - 12:19:08
71	2013/135	15-May	14:44:52	14:11:00 - 16:28:53
72	2013/171	20-Jun	14:33:30	13:43:00 - 16:16:53
73	2013/205	24-Jul	15:54:00	14:23:00 - 17:37:53
74	2013/248	05-Sep	15:36:00	14:03:00 - 17:19:53
75	2013/296	23-Oct	15:08:40	14:43:00 - 16:52:53
76	2013/297-298	24–25 Oct	<i>not known</i>	23:41:06 - 03:54:26
77	2013/331-332	27-28 Nov	00:18:00	about 23:35 - about 02:48
78	2013/352	18-Dec	15:12:00	14:31:00 - 16:55:53
79	2014/014	14-Jan	18:35:00	17:46:00 - 20:18:53
80	2014/036	05-Feb	16:31:53	15:33:00 - 18:15:53
81	2014/066	07-Mar	16:35:00	15:48:00 - 18:18:53
82	2014/097	09-Apr	15:41:51	14:06:00 - 16:58:53
83	2014/114	24-Apr	16:21:00	15:48:00 - 18:04:53
84	2014/149	29-May	15:19:20	14:38:00 - 17:03:53
85	2014/177	26-Jun	15:24:00	14:57:00 - 17:07:53
86	2014/204	23-Jul	15:07:17	14:43:00 - 16:50:53
87	2014/239	27-Aug	15:57:00	15:14:00 - 17:40:53
88	2014/260	17-Sep	16:06:00	14:58:00 - 17:49:53
89	2014/281	08-Oct	14:45:02	14:12:00 - 16:28:53
90	2014/292-293	19-20 Oct	unknown	23:44:35 - 03:52:29

AIRS/AMSU/HSB Version 6 Data Disclaimer

AQUA Maneuver Burn Table since Launch				
Drag Burn No.	Year/DOY	Date	Drag burn Start Time	AIRS READY MODE DURATION
91	2014/316	12-Nov	15:14:00	15:11:00 - 16:57:53
92	2014/337	03-Dec	16:24:16	16:22:00 - 18:07:53
93	2014/351	17-Dec	15:47:21	15:45:00 - 17:30:53
94	2015/007	07-Jan	15:19:30	15:17:00 - 17:03:53
95	2015/035	04-Feb	16:32:54	16:30:00 - 18:16:53
96	2015/057	26-Feb	15:32:14	15:29:00 - 17:16:53
97	2015/142	22-May	16:24:33	16:22:00 - 18:08:53
98	2015/183	02-Jul	15:19:20	15:17:00 - 17:02:53
99	2015/210	29-Jul	15:22:28	15:20:00 - 17:05:53
100	2015/246	03-Sep	14:57:35	14:55:00 - 16:41:53
101	2015/268	25-Sep	15:59:18	15:57:00 - 17:42:53
102	2015/288	15-Oct	15:01:41	14:59:00 - 16:45:53
103	2015/324	20-Nov	15:26:00	15:23:00 - 17:09:53
104	2015/350	16-Dec	13:50:00	13:48:00 - 17:13:53
105	2016/007	07-Jan	16:37:13	16:34:00 - 18:20:53
106	2016/042	11-Feb	15:00:59	14:58:00 - 16:44:53
107	2016/146	25-May	16:55:10	16:52:00 - 18:38:53

1.8 Version 6 (Collection 6) Data Advisory

Over time, we will endeavor to update this section to provide in one place a catalog of features and bugs discovered in the V6 data products.

1.8.1 Daytime Dry Bias of Total Precipitable Water Vapor

We have found a spurious ~7% negative (day-night) difference in global mean total precipitable water in Version 6. The bias is primarily due to low daytime values of total precipitable water vapor in regions with large amounts of mid- to high- level cloud cover. The source is felt to be reflected sunlight from clouds contaminating shortwave channels used by the retrieval algorithm.

Users can avoid this daytime dry bias by using total column water vapor data for which QC = 0.

There is no dry bias in nighttime total column water vapor data, so users may continue to use these data if QC = 0 or 1.

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